

Operating Conditions

Vacuum : $1\text{E-}10$ to $1\text{e-}11$ torr. Each separator has 1 220 L/s ion pump and 2 TSP pumps

Voltage: 0- 120 kV ; All separators have been conditioned at +/- 150 kV such that the spark rate is less than 1 spark/day. At 980 GeV the B17 and C17 separators operate at 120 kV. At collisions the IR separators operate between 85 and 110 kV. Current is limited to 8 ma max and typical values are 3-4 ma at operating voltages.

Locations : Separators are installed only in warm locations. They require a slot length of 102'' flange to flange (a extra 9'' is required on either end to reduce to the Tevatron beam tube). At locations with vertical separators, pits need to be dug into the tunnel for the HV feedthroughs.

-C:A1SVM	-A17 VERT. SEPARATOR V	0	-16.46 KV	....
-C:A1SVP	+A17 VERT. SEPARATOR V	0	-15.38 KV	..
-C:A4SVM	-A49 VERT. SEPARATOR V	0	-84.53 KV	....
-C:A4SVP	+A49 VERT. SEPARATOR V	0	-84.33 KV	..
-C:A4SHM	-A49 HOR. SEPARATOR V	0	88.1 KV	....
-C:A4SHP	+A49 HOR. SEPARATOR V	0	88.51 KV	..
-C:B0SHM	-B11 HOR. SEPARATOR V	0	-86.93 KV	....
-C:B0SHP	+B11 HOR. SEPARATOR V	0	-86.35 KV	.. -
-C:B0SVM	-B11 VERT. SEPARATOR V	0	-99.17 KV	....
-C:B0SVP	+B11 VERT. SEPARATOR V	0	-99.44 KV	.. .
-C:B1SHM	-B17 HOR. SEPARATOR V	0	33.95 KV	....
-C:B1SHP	+B17 HOR. SEPARATOR V	0	33.86 KV	.. .
-C:C1SVM	-C17 VER. SEPARATOR V	0	50.03 KV	....
-C:C1SVP	+C17 VER. SEPARATOR V	0	49.67 KV	.. .
-C:C4SVM	-C49 VERT. SEPARATOR V	0	-93.03 KV	....
-C:C4SVP	+C49 VER. SEPARATOR V	0	*-93.72 KV	.. -
-C:C4SHM	-C49 HOR. SEPARATOR V	0	-88.48 KV	....
-C:C4SHP	+C49 HOR. SEPARATOR V	0	-88.5 KV	..
-C:D1SHM	-D11 HOR. SEPARATOR V	0	-86.43 KV	....
-C:D1SHP	+D11 HOR. SEPARATOR V	0	-86.61 KV	..
-C:D1SVM	-D11 VERT. SEPARATOR V	0	* 104.6 KV	....
-C:D1SVP	+D11 VER. SEPARATOR V	0	106.1 KV	..
-C:D4SHM	-D48 HOR. SEPARATOR V	0	.264 KV	....
-C:D4SHP	+D48 HOR. SEPARATOR V	0	.354 KV	..

Power Supply

Each separator has a plus and minus power supply. Each supply consists of a high voltage Glassman driver and a high voltage diode stack that is in a pressurized SF₆ tank. Associated with each power supply is a water cooled shunt resistor (either 20 or 30 M-ohms). Each power supply is controlled by a CAMAC card (465). The interface between the CAMAC system and the power supply is via a FNAL designed set of NIM cards. There are 24 power supplies and shunt resistors, 44 one M-ohm surge resistors with spark detectors and 6 high voltage splitter cans. We presently have 4 complete spare power supplies (2 are used for conditioning separators at NWA) and we believe we have 4 more power supply tanks in storage but this must be verified. The only complete set of PS controllers we have are used for conditioning. Depending on the spare situation we may need to do some redesigning of the shunt and surge boxes as the resistors that are used are no longer available.

Assembly/Installation

All components are ultrasonically cleaned in a solution of distilled water and a detergent called micro (1% by volume).

All components are assembled in a clean room. After assembly each separator is baked to 300 degrees C and then conditioned under high voltage at 150 kV such that there is less than 1 spark per day in both polarities. This can take up to several months per separator. After installation there is a recovery bake to 150 degrees C.

Upgrades

- We plan to build 8 more polarity switches and install them on all separators. This will allow us to look at beam dynamics using protons on the pbar helix at all times on the ramp and through the squeeze.

- We are planning to build longer separators for the IRs. This will require longer electrodes. The vendor has been contacted and stated that they could make the electrodes up to 20% longer. Past experience has shown that straightness is a major problem and that we should allow a 1 year lead time on these. We may be able to use existing shells by adding extension Pieces.

- We are beginning tests on two new electrode materials: 1) Using aluminum instead of stainless steel and 2) glass coating on stainless steel. The tank for these tests is presently being baked at 300 degrees C.

New Separators

- Longer separators at IPs: there would be a total of 12 new separators plus 2 spares (one horizontal and one vertical). To save money we can use existing shells and add extension pieces . However we have 8 spare separators to use for this so we would have to shut down to remove 4, rework them and then install them with the other longer separators. The other option is to buy new shells. In order to make room for these longer separators we must 1) remove the unused Q1 magnets from A4 and B1 (requires a warmup) and 2) the Brazilian pots at D0 must be removed.

-Addition of more separators:

- Where? Warm space is available at A0 (where the abort system is located), at A17 (where there is an existing separator and four schottky detectors), at B48 (presently empty), at C0 (where BTEV will be installed at some later date) and D17 (collimators).

-How many new separators? An improved Collision helix would add 6 new separators, 2 horizontal and 4 vertical, at 4 new locations and eliminate one existing location ; D48.

This means we need three new power supply installations.

If we have four power supply tanks in storage then we would have one set of supplies left for spares and for conditioning.

We will need to order more cable and build 6 new shunt boxes and 10 new surge boxes. If we do not have enough shunt resistors (20 to 30 M-ohm) or surge resistors (1 M-ohm) new resistors will need to be ordered which may require some redesign. Biggest concern is that three new power supply control chassis and electronics will need to be made. We will need an engineer and technician time to get this done. Since 4 of the new installations is vertical, pits will need to be dug and liners made and installed. FESS will need to approve this.